

**UGANDA FISHERIES SECTOR  
REVIEW OF COMPETITIVENESS  
STRATEGIES  
Final Report  
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## ACRONYMS

AICHA	Agricultural Initiative to Cut Hunger in Africa
BMU	Beach Management Unit
COMPETE	Competitive Private Enterprise and Trade Expansion Project
DCA	Development Credit Authority
DFID	Department of Foreign and International Development
DFR	Department of Fisheries Resources
EAC	East African Community
EBB	Entebbe Airport
FY	Financial Year
GOU	Government of Uganda
ICT	Information and Communication Technologies
IDEA	Investment in Developing Export Agriculture
LVFRP	Lake Victoria Fisheries Research Project
LVFO	Lake Victoria Fisheries Organization
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MFI	Micro Finance Institutions
MTCS	Medium Term Competitiveness Strategy
MUK	Makerere University Kampala
NAADS	National Agriculture Advisory Services
NARO	National Agriculture Research Organization
PEAP	Poverty Eradication Action Plan
PMA	Plan for Modernization of Agriculture
PSF	Private Sector Foundation
RDC	Resident District Commissioner
SMS	Short Messaging Service
SPEED	Support for Private Enterprise Expansion and Development
SPS	Sanitary Phytosanitary
UCFF	Uganda Commercial Fish Farmers
UEBP	Uganda Export Promotion Board
UFCCA	Uganda Fisheries and Fish Conservation Association
UIA	Uganda Investment Authority
UNBS	Uganda National Bureau of Standards
UFPEA	Uganda Fish Processors and Exporters Association
USAID	United States Agency for International Development
UTPCBP	Uganda Trade Policy Capacity Building Project
UTRADE	Uganda Trade Revitalization and Diversification of Exports Program

## 1 EXECUTIVE SUMMARY

At USAID's request, CARANA undertook a review of the post-COMPETE implementation of the fisheries competitiveness strategy developed under that project. COMPETE ended in May of 2002, and the review covered the 7-month period from June through December 2002. Andrew Kaelin served as the expatriate consultant, and coordinated with local fisheries experts in order to conduct interviews and site visits to assess the extent to which cluster stakeholders have invested in or made commitments to implement elements of the strategy.

In brief, the key elements of the strategy are to increase the export value of the existing capture harvest through the introduction of value added products, while developing a commercial aquaculture strategy to create a renewable source of the principle fish species Nile Perch. The strategy entails:

- Improving the production value of existing harvest
- Introducing reproductive biology practices with hatchery trials
- Testing in-lake net cages and creating a monitoring and modelling program to examine environmental and productivity impact
- Facilitating finance and credit to support rollout of net cage trials
- Supporting the new GOU national fisheries management plan and the multi-country Lake Victoria Fisheries Management Plan, including support to the Department of Fisheries Resources to develop aquaculture regulations
- Improving the infrastructure in the sector, with a focus on landing sites.

### ***Status of Implementation:***

- A major impact of COMPETE project in the fisheries sector was in changing unrealistic perceptions relating to the sustainability of catch fisheries and gaining a national level commitment to the introduction of commercial aquaculture as the strategic cornerstone of the competitiveness strategy. Elements of the strategy that have moved forward since the end of COMPETE include:
- Ugandan fish processors are actively increasing the value they can derive from each Nile Perch, by developing products from previously discarded by-products for trial sales in Asia. Processors will be importing equipment to extract fish oil, which commands \$700 a ton in international markets.
- Ugandan processors are developing new valued added products for both the domestic and international markets and plan to exhibit, for the first time, at the European Seafood Exposition.
- Funding from the European Union (EU) was secured for participation of the Uganda Fish Processors (UFPEA) in the European Seafood Exposition.
- UFPEA web site was designed and implemented with the assistance and funding of SPEED.

### ***Status of Cluster Organization:***

The COMPETE project was designed to support the development of a fisheries cluster and a participatory process for developing a competitiveness strategy that enjoyed the support of all cluster stakeholders. These objectives were accomplished, although cluster dialogue has lost some momentum in the interim between COMPETE and the follow on activity. The principle

cluster stakeholders that are actively involved in the working group and in implementing the strategy include:

- Private Sector. Processing companies carrying out export activities. Improved value of existing harvest, through better utilization and value of by-products.
- Active investigations into commercial aquaculture are now underway by at least 4 private investors, and appropriate aquaculture species are being investigated.
- Uganda Fish Processors and Exporters Association
- The Fisheries Resource Department to ensure national exploitation of the resource through regulatory enforcement and policy.
- NEMA for monitoring of net cage culture and ensure conformity to safe environment production, and international water quality standards.
- The fisher folk – fishermen- the primary producers, fish processors/investors who provide the capital for large plants.
- The local authorities, who control the field extension officers and provide for the facilities at landing sites including feeder roads.
- The Uganda Fisheries and Fish Conservation Association (UFFCA) who organize the fisher folk at landings in markets.

***Recommendations for Transitional Activities:***

- Conduct Domestication and Feasibility Production Trials (AICHA)
- Build Capacity of Beach Management Units
- Develop Commercial Aquaculture Policy

***Recommendations for longer-term implementation activities:***

- Reduce Post Harvest Losses and Improve Fish Handling (UTRADE)
  - Develop Remote Landing Sites (UTRADE)
  - Improve Boat Technology
- Develop and Implement a Commercial Aquaculture Strategy
  - Create Investment Incentives for Commercial Aquaculture
  - Establish Laws to Safeguard In-Lake Aquaculture
  - Create mechanisms to support quality and food safety
  - Conduct Full Scale Production Trials
  - Support Development of Commercial Fish Feeds
  - Develop Net Cage Monitoring and Modelling
  - Develop Program for Impact Assessment of Net Cages
  - Develop Site Analysis and Net Cage Carrying Capacity Guidelines

## **BACKGROUND AND PURPOSE**

The fisheries industry has grown steadily over the past three years, and is now Uganda's second largest foreign exchange earner, bringing in \$80.4 million in 2001. Development and sustainability of the industry and of Lake Victoria have become one of the Ugandan Government's top economic priorities. COMPETE has laid out a strategic plan to improve the competitiveness of Uganda's fisheries:

- Improve the export value of the existing harvest, by improving the net usable yield of the fish, assisting with the diversification from low and medium value products into high value products and the extended utilization of fish carcasses, i.e. exporting fish heads, skins, extracting and exporting fish oil.
- Introduce commercial aquaculture, and create a renewable supply source of the principal fish species, Nile Perch. Participating in the domestication of this species, conduct cultivation trials, and supporting the development of fish feed formulations. Introduce net cages for evaluation, monitoring and modelling.
- Promote sustainability of the resource by applying laws and regulations. Support on-going initiatives on monitoring control and surveillance. Encourage prevention measures to stop smuggling and protecting the harvest.
- Capacity building, especially participation of Makerere University and support in the development of Aquaculture regulations. Development of a training program and aquaculture curriculum at the University
- Training in better capture methods, handling, storage and obtaining maximum use of the harvested product. Training in better capture methods, handling, storage and obtaining maximum use of the harvested product

USAID/Uganda, as part of its export competitiveness program, is putting into place a 5-year core activity, the Uganda Trade Revitalization and Diversification of Exports (U-Trade). The objective of this program will be to strengthen and expand agricultural and agro-industrial exports, including fisheries.

To ensure continuity and maintain the momentum created by COMPETE, USAID seeks to identify transitional activities that build on the sector strategies and lay the basis for the follow on project, U-TRADE. The purpose of this report is to:

- Review the post-COMPETE implementation of the Fisheries Competitiveness Strategy supported by USAID under that Project;
- Identify opportunities to further public-private dialogue between the fisheries “cluster” and the Government of Uganda (GOU); and,
- Identify specific implementation activities to further cluster development during the transition period.

The following section provides background on the methodology and team composition for this effort, and is followed by the results of the review.

## **2 METHODOLOGY AND TEAM COMPOSITION**

To carry out this assignment, the consultants began with an entrance meeting with USAID/Uganda to discuss key areas of concern in the fisheries. Thereafter, the consultants began an industry-wide consultation program with fisheries cluster stakeholders, including the private sector, relevant government officials, implementing organisations, donors, and others with information of relevance to the fisheries sector strategies.

The review involved visits to landing sites and processing plants in Masaka, Entebbe, Kampala and Jinja, where the largest numbers of people involved in, and/or affected by, fisheries activities are located. The consultants also conducted interviews with Uganda Commercial Fish Farmers (UCFF) who represent the nascent aquaculture industry in Uganda, and the Uganda Fisheries and Fish Conservation Association (UFFCA), which represent the fisherfolk. A three-day field trip was taken to 6 fishing villages and landing sights in the Ssesse Islands. The Chairman of UFFCA, accompanied Andrew Kaelin, and interviews were conducted with the village leaders, beach committees, and fisherfolk.

In addition to the consultations and field trips, the consultants reviewed reference documents provided by the COMPETE Project, USAID, SPEED, FRD, the Uganda Fish Processors and Exporters Association (UFPEA), UFFCA, and other organisations. Finally, a fisheries sector workshop was held, in which the fisheries cluster members, government officials, environmentalists, and other important members of the community exchanged views on how to develop and sustain the fisheries industry.

The review team for this task comprised three consultants (Mr. Andrew Kaelin, Mr. Pius Kwesiga and Chris Dhatemwa), who had been members of the COMPETE and who have extensive knowledge of the fisheries sector in Uganda and contributed to the development of the sector competitiveness strategy.

### 3 OVERVIEW OF FISHERIES SECTOR

#### 3.1 SECTOR STATUS

The Ugandan fisheries industry is currently based on inland capture fisheries from lakes, rivers and swamps, which cover an area of about 18% of the country's 241,038 km<sup>2</sup> of total area. Fisheries resources are obtained from five major lakes, namely Lakes Victoria, Albert, Edward, George and Kyoga. In addition, there are nearly 160 minor lakes that are largely unproductive. Lake Victoria is Uganda's most important fishery resource, by far, supplying some 50% of the national catch (Table 1).

**Table 1. Fish Catch, by Water Body**

Water body	Catch (x 000 tons)						
	1995	1996	1997	1998	1999	2000	2001
Lake Victoria	103.0	106.4	106.6	105.2	111.4	175.4*	110.0**
Lake Albert	16.4	21.9	19.1	19.1	19.5	18.3	
Albert Nile	4.7	4.6	3.4	3.5	3.7	3.0	
Lake Kyoga***	80.2	80.6	80.1	80.2	79.3	75.6	
Lake Edward, George & Kazinga Channel	5.2	4.8	6.4	5.6	5.8	5.3	
Other Waters	3.7	3.7	3.7	3.5	3.7	3.5	
Aquaculture	0.19	0.21	0.36	0.36	0.36	0.35	
Total	213.4	222.2	219.7	217.5	223.8	281.45	

Source: Fisheries Department in Statistical Abstract (2000);

\* Lake Victoria Fisheries Research Project -- LVFRP (2001);

\*\* Nile perch only

\*\*\* The DFID Integrated Lake Management Project estimates catch in Lake Kyoga in the region of 30,000 tons. The fishery of Lake Kyoga has changed over the past 20 years, moving from reliance on a prolific Nile perch population to an emphasis on tilapia fishery to its present domination by mukene.

It should be recognized that statistical data for the fisheries sector are weak and many of the figures may be overestimated. The most reliable data available are for export volume, which can easily be converted from yield to harvest data. These data exist, however, primarily for Nile perch, and do not take into account fish that is consumed domestically, or fish that is dried or smoked and sold in regional trade to the DR Congo, Rwanda and other countries.

Primary production is relatively small scale. Most fishing is carried out by individual fishers using small, wooden (plank built) boats that are approximately 6-8 meters in length, which use sail and oar. Apart from collection boats used by fish merchants and their agents, only 15% of boats are motorized. Access to fisheries resources does not seem to be a problem facing the fishermen. Their simple boats are sufficient to carry them to and from the fishing grounds with their catch gear and harvest of fish.

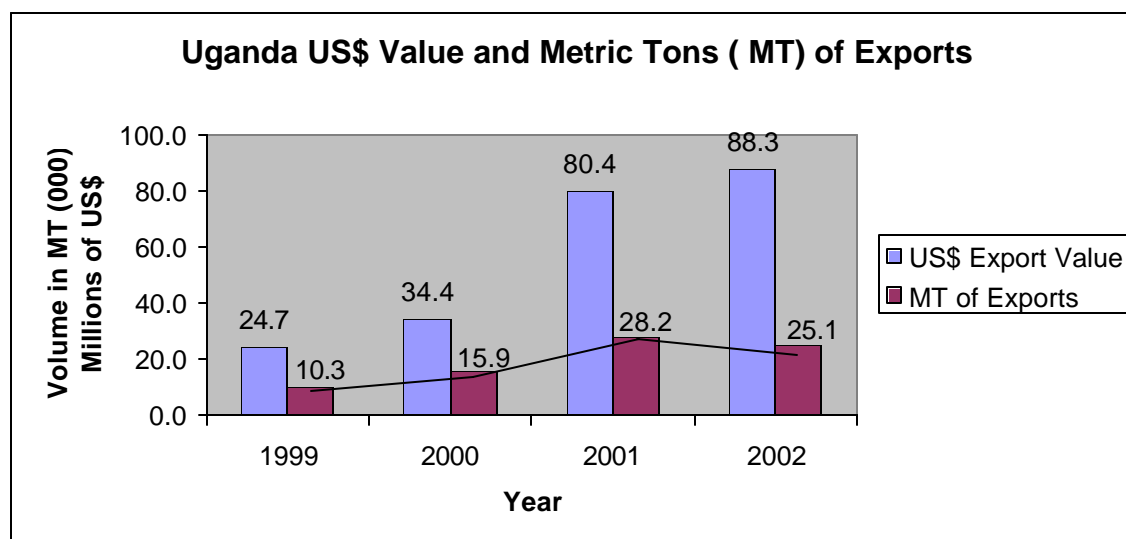
The major commercial fish species include the Nile perch (*Lates niloticus*), Nile tilapia (*Oreochromis niloticus*) and mukene (*Rastreneobola argentea*). In 1996, freshwater fisheries



generated about US\$35 million in exports to the major markets of Europe, Australia and Southeast Asia. This was estimated to have risen to US\$80.4 million in 2001. Fisheries contributed as much as 8.49% of the export revenue in 1998, as reported by the Uganda Investment Authority, in 2001 the export revenue from fish exports rose to 14.6% of the estimated US\$ 550 million export revenue.

Fish exports in 2001 were of the order of 28,200 metric tons, with a value of US\$ 80.4 million. This makes up a monthly total of about 2400 metric tons of finished goods, which is equivalent to about 70,000 tons wet fish weight harvested annually. A further estimated 50% of harvested Nile perch, often-immature fish, are consumed locally or exported to the DRC and Rwanda. This made the harvest of Nile perch from Lake Victoria around 110,000 tons in 2001. This compares with a total catch of 72,000 tons in 2000 (which had an export value of US\$ 34.4 million) when an export ban on Uganda-sourced fish was imposed by the European Union for much of the year due to outbreaks of fish poisoning, cholera and salmonella.

Nile Perch forms the bulk of the exports and foreign exchange earnings representing up to 90% of all fish products. Other products being exported are whole frozen fish, frozen gutted and headed fish, frozen fillets, chilled fillets and air-dried fish maws.



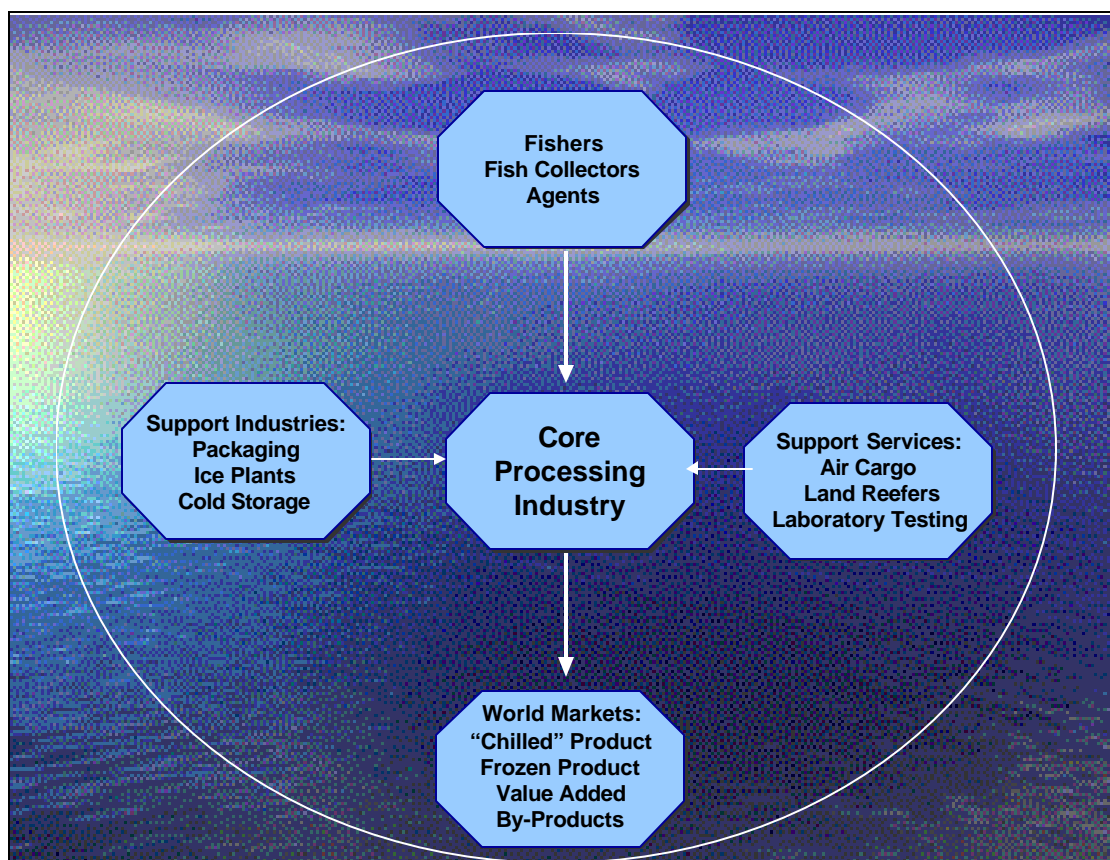
As noted in the chart above, the export value of Nile Perch continues to increase. However, as indicated by the trend line, the estimated tonnage (Metric Tons) of processed fish exported is now on the decline. Market demand has increased the sales price of fish. The average sales price of fresh/chilled fish for the European market has increased from \$2.40 per kg in 1999 to an estimated \$3.52 per kg in 2002.

The most distinguishing characteristic of the Ugandan fisheries sector is the fact that stocks are declining. Hard evidence that the current rate of harvest is unsustainable has been presented by the Lake Victoria Fisheries Research Project (LVFRP):

- The maximum sustainable yield (MSY) for Ugandan waters is estimated at between 64,000 and 76,000 metric tons, depending on which data source for standing stock is used. Even at the low end, the current harvest is close to or exceeds the MSY.
- The standing stock of Nile perch in Lake Victoria as a whole, was about 650,000 metric tons in 1999/2000, of which about 43% was in Ugandan waters. This had fallen to an estimated 540,000 tons by the end of 2001.
- Ninety five percent of the Lake's Nile perch biomass is below 50 cm in total length, the minimum recommended size for acceptance by processing plants. This means that the legal size fish used for processing come from a very limited percentage of the biomass.
- Total estimated catch of Nile perch for 2000 was 72,632 metric tons compared with an estimated 145,000 tons in 1990 when the fishery was at its peak. Preliminary estimates of the catch in 2001 were 110,000 metric tons. (Care must be taken when interpreting the 2000 data, as the EU ban on exports was in place for a high proportion of the year.)
- The exploitation rate is approximately 0.86 (e.g., 86% of the mortality is due to fishing). This should be reduced to about 0.45 (i.e. the harvest must be reduced by half) to achieve optimal yield.
- Catch per unit effort has declined from about 80 kilograms (kg) per boat day to around 45 kg. During field visits to the Ssesse Islands in November 2002, yields per boat of as low as 20 kilos were reported. (See Annex for report of Field Trip by Seremos Kamuturaki). Other biological indicators (size at maturity, growth, longevity and maximum size) of fish populations under stress also point towards heavy overexploitation.

### **3.2 FISHERIES CLUSTER**

The fisheries cluster in Uganda revolves around the processors, who are the principle leaders of innovation and investment within the sector. The processors are fairly well organized, but until COMPETE, the rest of the sector was not well integrated. Under COMPETE, a Sector Working Group was established, to provide a forum for all stakeholders in the cluster to participate in the assessment of competitive strengths and weaknesses of the sector and development of a competitiveness strategy.



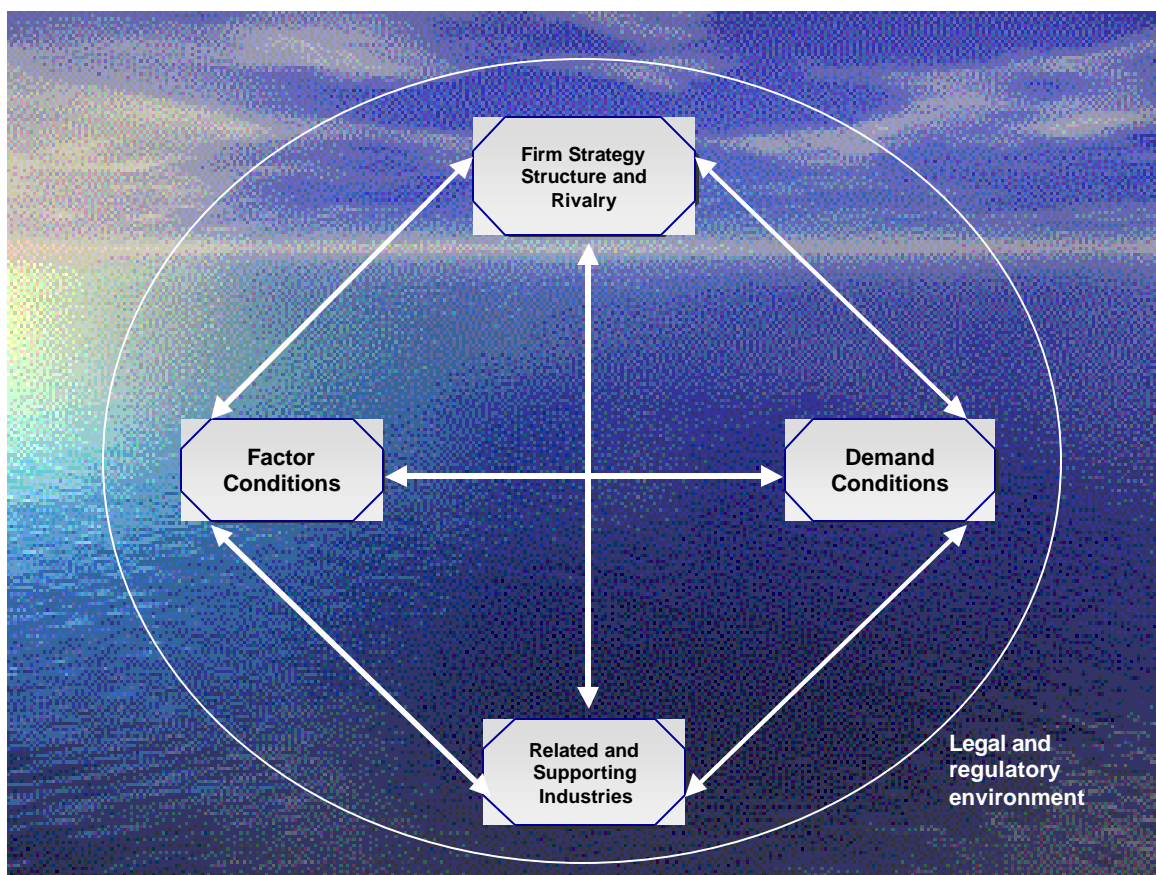
Under the COMPETE, the working group meetings were well attended and participation was active. Since COMPETE ended, however, the working group did not meet until it was convened for the December workshop to review progress in implementing the sector strategy.

#### Uganda Fisheries Cluster Stakeholders

Stakeholders	Description/Role
Beneficiaries	<ul style="list-style-type: none"> <li>Nearly 750,000 persons (700,000 around Lake Victoria) benefit from fishery-related activities, such as fish processing (artisanal and industrial), fish trade, boat building, net making, fishing equipment trade, fisheries research, extension services and administration</li> </ul>
Fishers	<ul style="list-style-type: none"> <li>Estimated 250,000 artisan fisherfolk (136,000 on Lake Victoria)</li> <li>Approximately, 15% are boat owners. A high percentage of the motorized canoes employ operators who generally receive 30 to 40% of the value of the fish. The boat owner is responsible for paying for the fuel, maintenance and nets used in the fishing effort.</li> </ul>
Collectors	<ul style="list-style-type: none"> <li>Collectors transport the fish to the processors, but also serve in multiple other functions in the supply chain. They collect the fish and transport it from remote landing sites, and they provide ice and insulated storage containers. They also provide catch</li> </ul>

	gear to the fisherman on credit, most often in the form of nets. These services are paid for and the profits of the collectors are generated from the spread on the cost of the fish in the remote location and the higher price that is paid by the processor.
Landing Site Management Units	
Processors	<ul style="list-style-type: none"> <li>Uganda currently has nine operational fish processing plants that serve the export market. Another two licenses were awarded recently and four more are pending.</li> </ul>
Buyers	<ul style="list-style-type: none"> <li>Belgium, (Groupe Auchan) Iceland (Icemark), Italian (Giolfo &amp; Calcagno), Dutch (Anova), Spain (Frinova)</li> </ul>
Input Suppliers and Supporting Industries	<ul style="list-style-type: none"> <li>Manufacturers of nets, insulated boxes and cartons</li> <li>Transport (air, overland, trucking)</li> <li>Investment, banking and microfinance</li> <li>Information and communications technology companies</li> </ul>
Associations	<ul style="list-style-type: none"> <li>Uganda Commercial Fish Farmers (UCFF)</li> <li>Uganda Fisheries and Fish Conservation Association (UFFCA)</li> <li>Uganda Fish Processors and Exporters Association (UFPEA)</li> <li>Private Sector Foundation (PSF)</li> </ul>
Government Stakeholders	<ul style="list-style-type: none"> <li>Fisheries Resource Department (FRD)</li> <li>Export Promotion Board (EPB)</li> <li>Uganda Investment Authority (UIA)</li> <li>Ministry of Finance</li> <li>Lake Victoria Fisheries Organization (LVFO)</li> <li>Makerere University Kampala</li> <li>Ministry of Agriculture, Animal Industry and Fisheries (MAIIF)</li> <li>National Agriculture Advisory Services (NAADS)</li> <li>National Agriculture Research Organization (NARO)</li> <li>National Environmental Monitoring Agency (NEMA), for monitoring of net cage culture and ensure conformity to sage environment production, and international water quality standards.</li> <li>Local Authorities, who control the field extension officers and provide for the facilities at landing sites including feeder roads.</li> </ul>
Donors	<ul style="list-style-type: none"> <li>EU</li> <li>DFID</li> <li>African Development Bank</li> <li>World Bank</li> <li>Japan</li> <li>USAID</li> </ul>

## 4 COMPETITIVE CHALLENGES AND OPPORTUNITIES IN THE FISHERIES SECTOR



### 4.1. FACTOR CONDITIONS

- *The current rate of harvest of Nile perch from Lake Victoria is unsustainable.* The single most important constraint to the continued export and expansion of Nile perch is the regional overexploitation of the resource. The rate of harvest, however, is being driven by government policy, which is to increase production to 280,000 metric tons, partly to supply excess processing capacity in Uganda. Furthermore, sanctions have been imposed on Kenyan fishermen exploiting Ugandan waters, and it is argued that fish that would otherwise be landed in Kenya where they command a higher price will now pass through Ugandan factories. Uganda has licensed additional factories in the border regions to absorb the supply that would otherwise be sold in Kenya, with the additional justification that this will bring economic benefits to these areas. While this might appear to be a simple transfer of processing capacity, in fact, it is additive from a regional perspective, and undoubtedly places more pressure on the already stressed resources of Lake Victoria and further deterioration of the stocks.

- *Open access fisheries and inadequate funding for effective enforcement hinders monitoring of compliance with regulations.* The Government departments responsible for managing, regulating and monitoring the fisheries are dispersed and decentralized, making coordination difficult. In 2002, the regulations proposed by LVFRP were enacted and these regulations have been harmonized with Kenya and Tanzania. A new net size of 6 inches for Nile Perch has been mandated, and a legal slot size from 50 cm to 85cm has been introduced. With the direct support of the President and the central government, the Department of Fisheries Resources (DFR) within the Ministry of Agriculture, Animal Industry and Fisheries (MAIIF) has been carrying out an active enforcement program of the new fisheries regulations. Still, as detailed in the report from the Fisheries workshop conducted on December 8, 2002, the average effort to catch (the amount of time, nets, and diesel needed to catch fish) has deteriorated as catches decline and less value is derived from the same amount of effort. Catches of 20 to 40 kilos are commonly reported, compared to 80-100 kilos reported 5 years ago.
- *Increasing use of illegal nets and gears is increasing the capture of immature and juvenile fish.* In 2000, 36% of the approximately 290,000 gill nets in operation in Lake Victoria were below the recommended minimum mesh size of 127 mm (5”), compared with less than 9% of the 75,300 gill nets in 1990 (note the four-fold increase in the number of nets over the ten-year period). The large-scale use of non-selective and environmentally damaging (illegal) gears, especially beach seines, which are mainly catching immature and juvenile fish, is undermining the potential of the resource to renew itself. This is linked to the high (unknown) volume of dried and smoked small fish exported to neighbouring countries.
- *High occupational hazards.* The weather on Lake Victoria often turns dangerous without notice and there are virtually no safety provisions on boats (such as watertight compartments or floatation devices). As fishermen move further offshore where there is a higher biomass than inshore, the dangers increase.
- *Lack of storage and ice facilities reduces quality and increases rejection of catch.* Inadequate storage facilities, the lack of ice on the fishing boats to maintain the quality of the catch, and the lack of simple procedures to keep the catch out of the sun and below ambient temperature all reduce the quality and export value of the catch as well as the price obtained by primary producers. Post harvest losses due to these problems are estimated to be as high as 20-40%, especially during months when the water temperature is high. Fish caught at higher temperatures warm to air temperature much faster than those caught in colder waters, so the need to get fish on ice as quickly as possible is paramount. Most fishermen do not own their own boats and motors, but work for boat owners who determine the terms of trade by financing catch gear. Since fishers only receive only 30-40% the value of the harvested fish, a portion of which could be rejected, their incentive is to over-fish to ensure that some portion of their catch is accepted.
- *Net cages are a cost-effective means of fish production that allows for individuals and small investors to produce fish.* Net cages, however, can have a negative impact on the water column—the area of water from the surface to the bottom—if they are not sited well, if the carrying capacity at a given site is not controlled, or if the stocking densities per cubic meter

of water are too high. All these factors can be addressed, but there is work to do in convincing key stakeholders, especially the Lake Victoria Fisheries Organization (LVFO). The COMPETE project was successful, however, in gaining acceptance of commercial aquaculture by the Department of Fisheries Resources through a trial production. Steps must now be taken to establish carefully designed production trials to monitor and model the environmental impact of net cages on the Lake. In addition, land-based aquaculture is being considered for commercial development and, if the proper species are identified, this also will be an important area of development.

- *A legal definition for use of water column for net cage farming does not exist.* If net cages are found to be a practical means for production with limited negative impacts, then the legal right of the net cage operator will have to be clearly defined.

## 4.2 DEMAND CONDITIONS

- *Nile perch is a virtually unknown variety of fish in international markets.* Although currently sold in Southern Europe, it has no product recognition either as a species or as a product of Uganda.
- *Uganda does not enjoy an image of product safety and quality.* Fish product importers in the EU have an unfavourable perception of products from the East African Community (EAC), including Uganda, with regard to quality and consistency of the product. This general perception leads to lower prices than would be offered for products with a reputation of good quality. In 1997, 1998, and 1999 the EU banned the import of fish to Europe because of fish poisoning, cholera, and salmonella, respectively. In response to this crisis, the processors made major investments in testing and certification to meet EU standards and regulations<sup>1</sup> and regain their market share. While this has been successful, problems remain and the poor enforcement capacity of the GOU could lead to future outbreaks.
- *Nile perch is an excellent substitute for traditional white fish filets.* Nile Perch has been found to be a perfect substitute for the traditional fish fillets favoured by the European market. With the beef scare associated with mad-cow disease, demand for fish in Europe has increased significantly, making market potential quite high. Uganda fish and fish products have also found a ready market in the USA, Australia, Hong Kong, Singapore, Japan, Egypt and Israel.
- *EU Regulation of European production has created market opportunities for Nile Perch.* Europe is known for its high consumption of fish and fish-based products, including cod, cod-like species, hake, halibut, hoki and others. European nations such as Spain and Portugal are among the largest per capita consumers of fish in the world. In the past few years, the

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<sup>1</sup> The EU requires processors to be certified using the Hazard Analysis Critical Control Point (HACCP) procedures (EC Directive 91/493/EEC). The directive lays down conditions for hygiene standards at all stages of production and processing to reduce microorganism contamination and spoilage rates. These include: general conditions for landing facilities; requirements during and after handling, including with respect to packaging; special conditions for handling products onshore; labelling on products; storage and transport; and product condition monitoring/documentation.



European Union (EU) is increasing its efforts to streamline catch quotas and limit fishing by the maritime member countries in order to better manage its natural fishery resources. New conservation measures by the EU have resulted in reduced quantities of available cod and cod-like species to the European consumers. Nile Perch can fill this market gap, if Uganda can differentiate itself from other Nile Perch exporters and create an image of a safe and quality product.

#### **4.3 FIRM STRATEGY, STRUCTURE AND RIVALRY**

- *Lack of research data and experience is a major obstacle to developing commercial aquaculture.* Aquaculture is the best way to compensate for the diminishing catch of Nile perch. Commercial aquaculture has excellent future potential but there is virtually no research of data with the commercial species Nile perch. Consequently, it will take a minimum of 2-3 years to conduct research and development. Limited research was carried out by the COMPETE project, with institutional assistance from the Zoology Department, Makerere University, which addressed basics such as handling and artificial feed acclimation, and investigating the practicality of using net cage for production.
- *The value of existing harvest can be increased cost effectively by improving the net useable yield of the fish.* A large international market for fish by-products is untapped by Ugandan processors. While processing value added products will require additional investment in processing lines and equipment, and the investment can be justified by the higher sales price captured.
- *Increasing popularity of ready- or semi-prepared meals creates opportunities to increase the value of processed fish fillets.* Nile perch is ideal for preparation with sauces and condiments used in ready and semi-prepared meals. The opportunity opens up possibilities for supplying fresh or frozen fish to supermarkets, freezer centres, schools, hospitals, airlines, cruise lines and food services in general. Expensive freight costs due to Uganda's land-locked nature, however, place a significant constraint on the production for export of consumer-ready tray packs and prepared meals. A re-processor friendly portion pack, which involves the preparation of the traditional fillet into convenient portions either in fresh or frozen form, can be used to optimize freight use while adding value to the product. In this approach, the processor is carrying out some of the processing work that the European re-processor in Europe would normally do, and thus reducing the expenses of the importer or re-processor. Such work can be done at much lower cost in Uganda, but requires total trust and understanding between the exporter and the importer. But given the lack of current processing capacity for value added products in Uganda, and the higher quality standards placed on ready meals, it is probably premature to target this market until such time as these standards can be met, to avoid potentially undermining Uganda's image in other markets.
- *Improved landing site management can solve many of the quality control problems.* With better organisation and simple insulation/storage facilities supplied with ice, fishermen would be able to maintain higher quality of product, negotiate better prices, and reduce fishing pressure. Experience in other tropical countries indicates that, with ice the shelf life of good quality fish can be extended for 10-14 days, so long as there are no quality deteriorations



prior to the fish being put on ice. Most processors buy at gazetted landing sites, where they have established regular buying arrangements. Most are now supplying ice, but the landing sites away from the main commercial centres or not supported directly by the processors still need to be addressed.

#### 4.4 RELATED AND SUPPORTING INDUSTRIES

- *Fish processors are reliant upon exporters as intermediaries to enter international markets and capture only a portion of the relatively high international market price for Nile perch.* They have little understanding of how to penetrate the direct markets and supermarket chains. The value of Nile perch in this market segment is considerably greater than what the exporters pay the processors: the Auchan supermarket chain in France pays 11 US\$ per kg compared to 3.52 US\$ per kg that the processor gets.
- *High transportation costs reduce potential for value added products.*
- *Lack of credit financing will hinder investment in hatcheries.* All species of commercial aquaculture require considerable investments in hatcheries and, in the case of Nile perch, concentrated research in the reproductive biology and the spawning and fry production increased the upfront investment. Uganda's Fisheries Policy has a clearly defined aquaculture development plan, but at present access to credit to develop this plan is very limited.

#### SWOT Analysis

Strengths	Weaknesses
Uganda has Unique Fish Stock Large Artisan Fishery Organized Processing Industry Abundant Water Resources	Open Access Fisheries Capture of Juvenile Fish Decline of Fisheries Stock Lack of Fisheries Research into Principal Commercial Species Lack of District Beach Management Units
Opportunities	Threats
Increasing Demand, Excellent Market Domestication of Nile Perch Commercial Aquaculture Co-Management using Beach Management Units	Poor image in external markets Inconsistent Fisheries Regulations Enforcement Pollution Effecting Water Quality Poor Infrastructure

## **5 RESULTS OF REVIEW**

### **5.1 POST-COMPETE IMPLEMENTATION OF THE FISHERIES COMPETITIVENESS STRATEGY**

Since COMPETE ended in May of 2002, important elements of the sector strategy have not gone forward because of lack of funding, including:

- Under the COMPETE project Makerere University and the Department of Fisheries Resources set up 6 tanks at the Entebbe aquarium for a Nile Perch culturing trial starting with 167 fingerlings. These experiments have been discontinued.
- Greenfields fish processing company offered a location for land based tanks to formulate and test fish feed for Nile Perch. Nile Perch acclimated to artificial fish feed in these tanks were be used to stock net cage trials, which will provide the data necessary to develop an viable model for in-lake fish cage farms and monitor and model environmental impact. This project has been put on hold by Greenfields while they do feasibility studies relating to the culture of Nile catfish (Clarias). There is still interest in conducting net cage trials with 2 private investors who have expressed interest in the commercial aquaculture of Nile Perch. These companies are Lake Victoria Fish Farms, and Uganda Fish Packers

Since COMPETE ended in May of 2002, important elements of the sector strategy have gone forward, including:

- Active investigations into commercial aquaculture are now underway by at least 4 private investors, and appropriate aquaculture species are being investigated.
- Ugandan fish processors are actively increasing the value they can derive from each Nile Perch, by developing products from previously discarded by-products for trial sales in Asia. Processors will be importing equipment to extract fish oil, which commands \$700 a ton in international markets.
- Ugandan processors are developing new valued added products for both the domestic and international markets and will exhibit, for the first time, at the European Seafood Exposition.
- Funding by the European Union (EU) for participation of the Uganda Fish Processors (UFPEA) to participate in the European Seafood Exposition
- Design and Implementation of the UFPEA web site, with the assistance and funding of SPEED

### **5.2 OPPORTUNITIES TO FURTHER PUBLIC-PRIVATE DIALOGUE**

A fisheries working group was formed during the COMPETE project. The group has broad support of all the important stakeholders. A meeting sponsored by USAID was held on December 6, 2002. Up to date information relating to the state of the fisheries was presented and strategic planning for commercial aquaculture was introduced. These meeting should be

continued and a recommendation to include banking and transportation industry representation should be followed. Implementation of transitional implementation activities will provide the focus for more frequent and action oriented working group meetings.

### **5.3 TRANSITIONAL IMPLEMENTATION ACTIVITIES**

The following “transitional activities” (assuming an implementation period of 12 months) must now be addressed in order to maintain current momentum and commitment by the GOU to implementing the strategy:

#### ***5.3.1 Begin Domestication and Feasibility Production Trials***

In the case of Nile perch, there are two phases of development. The first is the domestication, or feasibility stage. The second is the development of the commercial aquaculture industry, the delineation of guidelines for the industry, and the training and extension involved. The Domestication and Feasibility stage is envisioned as a stand-alone project with initial funding for one year. Additional funding and continuation of the project would then be requested from the continued funding of the USAID Initiative to End Hunger in Africa (IEHA), or integrated into the UTRADE project.

The initial step would involve organizing a team of international fisheries biologists to provide long-term resident assistance to Uganda. This team would include local institutions, such as the NARO Aquaculture Research Station, and the Aquaculture unit of the Department of Zoology of Makerere University. Facilities would be contracted with these institutions, and also specialized tanks, equipment and net cages would be installed for hatchery production experiments and net cage growth trials and impact studies. The research program, contracting of foreign fisheries biologists, and the research and technology transfer, would be under the direction of the Project director and in country technical director.

The project would begin by using captured Nile perch gravid females, and fingerlings from the wild to establish a base line of information critical for the handling, spawning and production of the species. The second stage would include practical spawning, fertilization and production trials. A feed component has also been included, and equipment for the development and testing of low impact high quality Nile Perch feeds has been considered. Technical assistance and the eventual technology transfer is also envisioned. Knowledge of spawning, maturation, and hatchery development are critical to advance the commercial aquaculture production of the Nile Perch.

#### ***5.3.2 Build Capacity of Beach Management Units***

With the assistance of the EU funded Lake Victoria Fisheries Research project new fisheries regulations, were implemented by the Department of Fisheries Resources (DFR). These regulations have been successfully harmonized with Kenya and Tanzania, and are being strictly enforced by DFR. The future success of the regulations will depend on the empowerment of the local fisheries organizations known as Beach Management Units (BMU). It is therefore vital to

the recovery of the capture fishery stock, that funding be made available for capacity building of the Beach Management Units.

### **5.3.3 *Develop Commercial Aquaculture Policy***

Investigate into the development of an aquaculture development authority should be advanced during a transitional period. This authority would be established with the aim of having a “one stop” location for the assessment, review and licensing of aquaculture investments.

## **5.4 LONG TERM IMPLEMENTATION ACTIVITIES**

### **5.4.1 *Reduce Post Harvest Losses and Improve Fish Handling (UTRADE)***

Post harvest losses are currently because of the lack of ice and insulated containers. Water temperatures vary during the year, but in general temperate so at time of harvest, fish temperature are relatively high. Harvest boats have no ice or refrigeration. At some remote landing sites, collectors have placed rudimentary insulated containers with ice, but ice at landing sites often is not sufficient, depending on catch levels. And when catch is low, it takes longer to fish and longer to get to the initial landing where ice may be in short supply. Therefore, to reduce post harvest losses in the short term, investment in landing site equipment and supplies and in cost effective boat technology is recommended.

#### **5.4.1.1 Develop Remote Landing Sites (UTRADE)**

Provide remote landing sites with sanitary facilities, an ice supply (either by transport or by providing generators and ice making machines if the site is large enough), and well-constructed insulated containers to hold fish at proper ratio of ice to fish (2 to 1). The Japanese are currently funding improvements at several EU gazetted landing sites and the African Development Bank has identified about 10 additional larger landing sites for investment. USAID should focus on smaller fishing villages where fish are landed and waiting for collectors to pick up. Conduct an evaluation and select remote landing sites for improvements and develop off the shelf package of equipment and services

#### **5.4.1.2 Improve Boat Technology**

Evaluate opportunities for developing market-based, low costs solution to transport, including diesel solutions (currently fishers are using gasoline two-cycle engines) and low-cost fishing vessels equipped with sails (currently fishers are using makeshift sails, by tying a burlap sack onto the end of an oar and tying it off to end of boat to catch wind).

### **5.4.2 *Develop and Implement a Commercial Aquaculture Strategy***

#### **5.4.2.1 Create Investment Incentives for Commercial Aquaculture (UTRADE)**

Retain a small enterprise development and/or microfinance expert to assess and develop recommendations, including:

- Start up financing for hatchery development
- Incentives to aquaculture companies to subcontract to individual households to culture fish

#### 5.4.2.2 Create Laws Safe Guarding In-Lake Aquaculture (FRD, UTRADE)

Create a license for the right to use the water column within the water body, which is state property.

#### 5.4.2.3 Create mechanisms to support quality and food safety (UTRADE)

Using barcode technology, create a “traceability” system for net cages that reinforces compliance with quality and safety standards and links primary producers with international markets.

#### 5.4.2.4 Conduct Full Scale Production Trials (IEHA, UTRADE)

At present Uganda does not have sufficient hatchery capacity even for the native tilapia and catfish. A government-stocking program of reservoirs and inland lakes has stimulated the production of these species. However, very little work on the domestication of Nile perch has been carried out. The domestication of this principal commercial species will require considerable technical and financial inputs for the development of spawning, fertilization, hatchery skills, and for the development of an artificial feed for this predatory species. A time frame of approximately three to five years will be needed for this effort. The following is the sequence of project development.

Organize a technology team to work on the spawning and fertilization of Nile Perch. This team would include foreign technicians that have experience developing spawning and fertilizing predatory species of fish. Local fisheries biologists from NARO, The Fisheries Research Institute and Aquaculture Development Centre in Kajansi, as well as professors and graduate students from Makerere University, would also be associated or incorporated into the project.

Establish a hatchery process, including the spawning, fertilization, feeding and maturation of the fry and fingerling of the Nile Perch. Since we are working with a new species that has not been domesticated, this will be the most time consuming part of the aquaculture development process. This is a critical area of research that requires an expert fisheries biologist with experience in working with exotic species.

#### 5.4.2.5 Support Development of Commercial Fish Feeds (IEHA)

Simultaneously conduct feeding trials with Nile perch fingerlings sourced from the lake, study their feeding habits, and attempt to acclimate them to some form of artificial feed.

#### 5.4.2.6 Develop Net Cage Monitoring and Modelling (UTRADE)

Conduct net cage experiments, monitoring and modelling the impact of cages on the growth and reproduction of captive fish. Net cage trials will be conducted in the River Nile and in Lake Victoria. These trials would be conducted as soon as an artificial feed is developed that is

suitable for the Nile Perch. Develop fish formulations using locally produced ingredients, and compare the growth of natural feeds and artificial feeds for the purposes of determining the growth rates of the fish in captivity. These trials will be conducted in collaboration with project staff and graduate students of Makerere University. Thus, the project will train university-level staff in practical aquaculture practices. The private sector will also directly participate in the trials, with the lead being taken by the processing industry.

#### 5.4.2.7 Develop Program for Impact Assessment of Net Cages (IEHA, UTRADE)

When a breakthrough is made in the spawning, fertilization and production of fry from captive females, and their progeny are in maturation tanks, then: (1) conduct small-scale production trials, using a trial cluster of net cages to determine the production results of hatchery fish, growth and impact of the net cage cluster: (2) Conduct growth trials on the aquaculture of Nile perch, and (3) establish a base line of research information on the behaviour of this species in captivity, at all phases of development, in the fingerling, juvenile and adult stages.

#### 5.4.2.8 Develop Site Analysis and Net Cage Carrying Capacity Guidelines (UTRADE)

Conduct density trails and carrying capacity studies for net cage production areas. This will give a base line of information and assist with the development of a licensing programs for net cage farming in specific locations, choosing specific locations for interested private sector parties, and in conjunction with NEMA, establish a procedure for determining net cage density.

Year 1																									
<p>Facilitate invitations for foreign hatchery experts.</p> <p>Install technology team and facilitate working arrangements.</p> <p>Conclude arrangements for locations and facilities and begin feed and spawning trials.</p> <p>Establish research program and begin collaboration with Fisheries Research Institute and Makerere University.</p> <p>Begin funding research programs related to the biology and aquaculture of Nile perch.</p> <p>Begin feed development and conduct feeding trials with Nile Perch fingerlings sourced from the lake with a variety of imported artificial feeds. Conduct feed trials with natural feeds.</p> <p>Establish remote locations for spawning of captured Nile Perch.</p> <p>Based on the success of adapting Nile Perch to artificial feed, begin in-lake trials of net cages in Lake Victoria, and the River Nile and other suitable locations in Uganda.</p>		X																							
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Year 2-3																									
<p>Continue in-lake trials of net cages in lakes Victoria and Kyoga, the River Nile and other suitable locations in Uganda.</p> <p>Establish an Aquaculture Development Board that would report directly to the fisheries department.</p> <p>Establish laws safeguarding in-lake net cage production, develop licensing program for net cage farming.</p> <p>Based on results of the research and production trials, develop long-term strategy for aquaculture development.</p> <p>Conduct monitoring and modelling of net cage trials in order to determine the impact on water quality and add in determination of site density of netcages</p> <p>Develop and fund a fisheries training program, provide technical assistance and production demonstrations of Nile perch and other important commercial species. [What's the difference between this bullet and the previous one?]</p> <p>Develop production manuals for primary commercial aquaculture species.</p> <p>Provide incentives for commercial aquaculture.</p> <p>Conduct stock enhancement studies and establish viability.</p> <p>Develop tracibility and product coding system</p>									X																
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## ANNEX I

### Contact List for Design Stage of U-Trade

	Names	Title	Organization	Telephone/E-mail
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## ANNEX II

### **PROCEEDINGS OF THE FISHERIES SECTOR WORKING GROUP WORKSHOP HELD AT THE GRAND IMPERIAL HOTEL, KAMPALA ON DECEMBER 6, 2002 AT 9.00 AM.**

#### **A Fisheries Workshop**

#### **A Review of the Current Status of the Fisheries Sector**

#### **With Special Emphasis on**

#### **Strategic Planning for Commercial Aquaculture**

#### **Sponsored by USAID**

#### **Hotel Grand Imperial, December 6<sup>th</sup>, 2002**

#### **Moderator: Andrew Kaelin**

#### Agenda:

9:00 am	Registration
9:30 - 11:00 am	Review Current Fisheries Policy, Department of Fisheries Review Factors of Production, Structure, Industry Cluster, Demand & Markets
11:00 - 11:30 am	Tea Break
11:30 – 1:00 pm	Current Status of Fisheries Industry, UFPEA, Yogesh Grover, Chairman Industry Representatives: Philip Borel, Manoj Sreelanta  Fisher Folk Perceptive: UFFCA, Seremos Kamuturaki, Chairman
1:00 - 2:00 pm	Lunch
2:00 – 3:30 pm	Status of Commercial Aquaculture Uganda Commercial Fish Farmers Pond Culture Current Research, Appropriate Fish Species
3:30 to 4:00 pm	Tea Break
4:00 to 5:30	Nile Perch Aquaculture, Recent Experiments, Nile Perch in Captivity, Nile Perch Feeding, The Use of Net Cages, Required Research Recommendations of Appropriate Actions

### Opening session:

Mr. Andrew Kaelin, Fisheries Specialist Moderator opened the workshop by outlining the objectives of the workshop which were:

- To review the current status of the fisheries sector for morning session.
- To come up with a strategic plan for commercial aquaculture for the afternoon.

Mr. Jeff Levine clarified that USAID felt that the good work of the COMPETE project has to be continued. There was a need to design a team to convene in February or March 2003 to meet the working group so that whatever concerns of the industry are incorporated in the design of the U-Trade project.

## **(A) REVIEW OF THE CURRENT STATUS OF THE FISHERIES INDUSTRY:**

### **1. FISHERIES POLICY REVIEW**

Mr. David Tilia, representing the Commissioner for Fisheries pointed out the following:

- (a) There were a number of wrangles in the shared waters regarding the levels of exploitation by the nations sharing those waters. However, there has been deliberate effort by the Government to stamp out illegal fishing practices and this was aimed at protecting the industry including the fish processing establishments. The policy is based on sustainable exploitation of the fishery resource.
- (b) The illegal fishing methods being used have produced more than 50% of the fish catches as immature.
- (c) The fish catches are fluctuating at around 220,000 tonnes per year. Aquaculture is an alternative source of raw material especially if it is done on commercial level.
- (d) There is need for clear information flow between the administrators and the fisher folk.

### Discussion

- Regional trade is a significant outlet for fish.
- Regarding the methodology of implementing sustainability of the resource, the private sector appreciates the efforts of the fisheries Resource Department (FRD).
- The FRD should set in place a Permanent mode of consultation with the stakeholders before rigorous enforcement.
- While the Task force was a good idea its composition could have involved stakeholders.
- The regional dimension could be handled by LVFO especially in monitoring.
- The new statutory instrument has changed the legal minimum length of the Nile perch from 18 inches to 20 inches (50cm). Although this was done after regional consultation there was no consultation with local stakeholders especially the fisher folk who had invested heavily in 6" gillnets that were now catching the prohibited size of Nile perch.

## 2. CURRENT STATUS OF THE UGANDA FISHERIES INDUSTRY - FISHER FOLK PERSPECTIVE.

Mr. Seremos Kamuturaki, Chairman UFFCA in his presentation made the following after surveying the status of 6 fish landing sites of Kalangala islands.

- (a) The level of fish catches cannot provide a viable income due to the dwindling fish stocks. The fisherfolk were operating at a loss.
- (b) The concerns of the fisherfolk were:
  - Inadequate fishing inputs especially after what they had invested in had been rendered illegal.
  - The open access policy was allowing too much fishing effort.
  - Weak law enforcement
  - Deepening poverty
  - Lack of alternative means of livelihood/employment.
  - Increasing fish demand.
  - Processing plants were market destination for immature fish.
- (c) Way Forward
  - There is need for an intensive awareness raising and educational programme for the fisher folk
  - The rehabilitation and sustainability of the resource requires community-based management.
  - Alternative employment for the fishers through diversification.
  - Need for involvement of women in fisheries.
  - Fostering self-reliance of fisheries organization.

### Recommendations

- Encourage districts to enact ordinances.
- Strengthen management capability of the fishermen organizations e.g. Beach Management Units (BMU)
- Support community based fisheries management.
- Improve compliance with management regulations by:
  - Involving stakeholders in enacting regulations
  - Increase enforcement capability.
- Undertake awareness building on environment and resource conservation.

### Discussion

- Closed seasons could be set depending on research findings.

USAID showed willingness to support:

- (i) Technical assistance at levels of produces, processors, administration and research.

- (ii) Small grants could be made available for associations on publicity programmes. This can be done in conjunction with micro-finance institutions.
- (iii) Diversification of incomes of the fishing communities.

### **3. FISH PROCESSORS PERSPECTIVE - Mr. Philip Borel made the following points:**

- (a) There have been enormous achievements e.g. UFPEA, Quality Managers, ISO Standards, HACCP, by the processor but are they sustainable.
- (b) The FRD is well placed as a COMPETENT Authority to guarantee quality for fish exported to EU.
- (c) Deepen partnership between FRD and processor into other areas other than marketing e.g. fisheries regulation and control.
- (d) Export of fish provides potential for aquaculture to fill the gap for the demand or fish.
- (e) There has been support to industries e.g. packaging, ice plants cold rooms, airfreight service and private laboratory services.
- (f) Provide well-established mechanisms of collaboration e.g. presence working group.
- (g) Fisheries Agency should be set up together with Private Sector but not as an ad hoc committee.
- (h) Monitor Regulatory Trends of Principal Markets and initiate Rapid response.
- (i) There is need for improvement of the high landing sites.

### **4. FISH PROCESSING INDUSTRY – THE UFPEA VIEW**

Mr. Moses Ogwal the Executive Secretary of UFPEA outlined the following:

- (a) The objectives of UFPEA
- (b) UFPEA was a direct investment of over \$100million by the members.
- (c) The members have contributed to:
  - (i) The development of landing sites.
  - (ii) The development of the eight industries.
  - (iii) The development of a range of products including packaging.
- (d) The sustainability of the Fisheries resource was now hinged on the recently introduced slot size (with minimum size for Nile perch being 50cm). The current fish exports are about 28,000 tonnes of fish products equivalent to 60,000 tonnes of raw material.

SWOT analysis:

#### Strengths of UFPEA

- Strong regulatory authority
- Stronger UFPEA
- Firm base investment
- Organized fish folk

### Weakness

- Inadequate resources for research and promotion
- No produce identity in the market
- Product sold in lower segment of market
- High post harvest losses

### Opportunities

- Growing international market
- Value added products demanded
- Possibility of newer markets (AGOA)
- Favourable condition for aquaculture

### Threats

- High pressure on the stocks
- Farming of Nile Perch in other counties
- Farming of substitute products (cod in Norway)
- High costs of freight and utilities

- (e) Strategy (Way Forward)
- i. Manage wildlife stocks effectively
  - ii. Promote R&D of aquaculture
  - iii. Promote source of clean, natural and sustainable wild fish resource
  - iv. Create identity of fish and promote it
  - v. Improve production methods
  - vi. Research market

### Discussion

- Press could help to counter the reported cholera outbreak, which could adversely affect the export market.
- Present working group to be supported as a permanent institution.
- Post harvest losses could be studied in terms of loss of value down the chain.
- By products need to be handled at acceptable standards. The by-products can be used for value addition.
- Fisheries Agency – There seem to be some reservations about creating a fisheries Agency due to too many agencies being created.

## **(B) STRATEGIC PLANNING FOR COMMERCIAL AQUACULTURE**

1. Public Policy support
2. Research Technology and Species
3. Means of production and location
4. Investment needed and financing
5. Marketing.

The above broad sectors were placed on the Board and the card system used to determine the emphasis for areas of intervention.

### Public Policy Support

The following points clearly came out:

- Aquaculture process procedures
- Support for new species
- Stream line EIA procedures
- Investment desk at FRD
- Taxation and cess - Require framework of use of the funds
- Land tenure utilization – to assure water column ownership of property
- Reasonable cost of water
- Government should get leasehold ownership for private investment

### Means of Production and location

- Land based ponds
- Net cages could be put up in unity of two
- Lakes and Rivers
  - i. Satellite lakes for stocking for aquaculture.
  - ii. Restocking programmes.

### Pond Culture Review

It was recognised that presently pond culturing is predominant. The following points were made:

- Nile Perch culturing is possible
- Need to develop regular supply of high quality feed to be strategically put in place.
- Research and Technology Transfer
  - New technology required for commercial aquaculture on a modern scale hence need for R & D.
  - Culturing of Nile perch in ponds and net cages in the lake (collaboration by all stakeholders required).
  - Information on (lates caricalifier) Barimunde available for reference purposes.
- Sector Plan Components
  - Presently Nile tilapia & *Clarias gariepinus* being cultured in Uganda.
  - Technology requirements in selection, population control, breeding and feeds.

### RESEARCH TECHNOLOGIES AND SPECIES

The following species were identified:

Native species	Exotic (Non-native)
Common carp	Lates calciarifer
Rainbow trout	Cray fish
Nile Perch	Vietnam cat fish
Nile tilapia	Bull frogs
Mamba	Ornamental
Mukene	American cat fish
Clarias	EU
Haplochromines	Rainbow trout
	Snake head

Common carp  
Peacock bass  
Grass carp  
Chinese corps  
Macrobrachium

Having identified the fish species these issues came up:

- Next step to have a multidisciplinary approach to the culturing of Nile perch.
- Industry should sponsor research through demand
- Small Nile perch experiments will not help. There is need for heavy investment in researching this species
- Nile perch should have a well-designed research programme to explore problems of spawning in captivity, food for the early stages fish biology
- There is need to establish an investment desk at the FRD

#### INVESTMENT NEEDED AND FINANCING

The following were identified:

- Private investment in production
- Loans for business ventures
- Grants for technical assistance as a public good
- Private investment firms
- Public and/or Private investment in Research
- Sector working group should have a banker as a member
- Funds for upgrading existing equipment/machinery in fields industry

### ANNEX III

#### FISHERIES SECTOR WORKING GROUP WORKSHOP HELD IN THE GRAND IMPERIAL HOTEL, DECEMBER 6, 2002 AT 9.00 AM

	Names	Title	Organization	Telephone/E- mail
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